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VERMINOUS PARASITES AND VETERINARY PRACTICE*

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It is hardly necessary to say, in opening this discussion, that the title was chosen before the paper was prepared, in order to permit the talk to take any turn that less superficial consideration might direct. It ought, perhaps, to be made clear, at the beginning, that the title, *Verminous Parasites and Veterinary Practice*, has no essential connection with any of the Government services. Nevertheless, I propose to stray a little from the specialist's theme of the life history of worms, of diagnosis and treatment, and to attempt to stimulate a discussion of a more general nature on the position of the veterinary practitioner in relation to helminthic disease, referring to a few points of what may be termed " helminthological news " in the course of these more general remarks.

One cannot think for long about the association between helminths and veterinary practice before one realises that there are two different kinds of relationships between veterinarian, client and animal, and it may lead towards clarity if we separate the two right at the beginning; first, dog and cat practice, dealing with what may be called the " companion animals," including pets of all kinds; and, second, agricultural practice, in some ways a much more serious business, where the economics of the situation are an important consideration.

Perhaps some of us are a little too ready to depreciate the social value of veterinary work among the companion animals, although from the point of view of human happiness it is of considerable significance. For the purpose of subsequent discussion, however, it might be advantageous to consider for a few minutes the importance of one or two of the commoner helminth parasites to the animals themselves.

No sooner does one begin to look into this matter than one finds how little definite information there is; in fact, apart from work on canine hookworm infestation, carried out with the idea of furthering knowledge on human hookworm, practically nothing appears to have been done to find out the possible disease significance of these very common parasites. As an example, reference might be made to the popular association between fits in puppies and the presence of ascarids. It seems quite likely that there may be a direct association, yet, so far as I am aware, no experimental work has been carried out to show that there is a simple relationship of cause and effect. These worms are so prevalent that one might expect to find fits of much more common occurrence than they actually are. I am reminded of the caecum-worm scare which at one time filled the pages of the poultry Press and might be said to have struck fear into the heart of the poultry industry. These reports made reference to the ' widespread appearance of this awful parasite ' that suddenly became ' the greatest present threat to the poultry-farming community.' According to these professional journalists (and casual observers) ' the truth about this parasite was there for anyone to see. Where birds were found to be in poor condition in spite of the best feeding, some of them perhaps going light, it was only necessary to kill one or two of those worst affected, and to examine the blind gut to see for themselves that it contained these parasites—wicked, white, writhing worms.'

The explanation of the scare was to be found, of course, in the ubiquitous distribution of the parasite which of all helminths appears (apart from its transmission of blackhead) to be the least harmful; in fact, one group of American investigators actually came to the conclusion that the caeca of chickens which had never been infected with this worm were anatomically or physiologically abnormal. If the caecum-worm scare-mongers just referred to had only examined a few healthy controls they would have found the same parasite to be present and the scare would never have arisen.

On account of the very wide distribution of ascarid worms in puppies one wonders whether controlled experiments might possibly disprove the theory of fits being caused by worms. Although it seems justifiable to suppose that irritation caused at the pyloric sphincter by parasitic worms may sometimes evoke fits, it would be interesting to know how frequently this may happen.

A similar example is the association made by some cat and dog practitioners between an eczematous condition of the skin of dogs and worm infection. This is another point that is worthy of experimental investigation: in the past we have been too fully occupied with economic matters to do anything about it, but we may now hope to see some clarification of these points through the work of the " Animal Health Trust."

Before going on to the consideration of the much more important matter of helminthic disease in the economic field a reference might perhaps be made to the satisfactory relationship between practitioner and client which generally holds in this field of work with the companion animals. In this instance the owner is not all the time asking, " Will it pay me to have anything done?" The veterinary practitioner is called in to treat a personal friend in the form of a dog or cat, he prescribes a safe anthelmintic which removes a few of the worms for the owner to see. Although, perhaps, a little annoying to the dog or cat, this gives satisfaction to the client and to the practitioner, who, as a rule, has no difficulty about payment for his work.

In connection with the wounding of the aesthetic sensibilities of cat- and dog-owners through the presence of these disgusting parasites in their animals, it is important to remember the rapidity with which some of the new taeniacidal drugs may act, and if a lady brings an infected dog to the surgery for treatment to keep the animal there until the treatment has been completed. I have a vivid mental

* Presented to the Scottish Metropolitan Division, N.V.M.A., at Cupar, Fife, June 21st, 1950.

picture of some yards of tapeworm trailing posteriorly from a much-groomed and much-loved dog on the way home from the surgery, and of the lady owner climbing a lamp post.

Coming now to the sphere of greater moment—of parasitic worms among the animals of economic importance—it is at once evident that we are dealing with a very different proposition in the farmer-owner who is endeavouring to make a livelihood out of his cattle, sheep or pigs. A few parasitic worms are neither here nor there, and as he is continually weighing expenditure against returns the first thing we must think about is the amount of harm that is actually caused by the worm parasites in farm stock.

In general, we may suppose the level of worm infestation among grazing animals to be much higher than is found among the companion animals that we have just been considering. Grazing animals are continuously passing loads of infection on to the very food that they eat, and as a result of the crowded conditions of our agricultural pastures the worms are numbered in thousands instead of in the ones and twos that are seen in dogs and cats. Assessment of actual loss is a difficult matter and much of what has been published amounts to little more than an expression of expert opinion. It might even be suggested by unkind people that these figures are particularly liable to exaggeration on account of the expert desiring to magnify his own importance. It is interesting, therefore, to recall the conclusions reached by Dr. J. R. Mohler, one-time head of the U.S. Bureau of Animal Industry, and a great international figure in veterinary science, who, not being a parasitologist, concluded that parasitic worms were the greatest single cause of loss to American livestock. The figures, which are published in the U.S. Year Book entitled " Keeping Livestock Healthy," show that " at a conservative estimate " parasitic worms were causing a loss of $125 million in a year, whereas brucellosis was thought to cause a loss of only $30 million, mastitis $19 million, tuberculosis in all farm stock 10 million and Johne's disease only $500,000.

The reason for this loss is, of course, not to be found in the greater severity of helminthic diseases, but in their universal distribution. An admirable example of the tremendous effect of a widely distributed cause of morbidity recently came to my notice from a different field of agricultural endeavour and will serve to explain the way in which these losses may escape our notice. It concerns a certain fungus disease of oats known as yellow-leaf-stripe, which until very recently was of universal distribution, This fungus appeared wherever oats were grown, but as it did not seem to affect the oat plants adversely, no endeavour was made to bring it under control, nor would any further notice have been taken had not a chance observation clarified its great importance. In the course of experimentation designed to improve dressings for seed oats, prior to sowing, for the purpose of controlling smut and rust of oats, it was observed that certain new dressings resulted in an increased yield of some 20 per cent., an increase that could not be explained by the mere control of smut and rust, as other dressings with which comparisons were being made were also controlling those fungae. It was then found that the beneficial new dressings were controlling yellow-leaf-stripe, and the new and surprising information was acquired that this ever-present parasite, previously thought to be harmless, had been killing some 20 per cent. of the freshly-germinated seed before the young plant appeared above the surface of the ground and very considerably reducing the complete oat crop of the country. This case is parallel with some of the widespread infestations of helminth parasites in our grazing animals; the loss is not self-apparent and only becomes evident when controlled experiments are carried out to demonstrate the effects of the sub-clinical infestation.

It is not easy for us to maintain our rightful position as the guardians of animal health in this very extensive field for veterinary work in the prevention of sub-clinical disease. Although there is a large amount of most useful advice that the well-informed veterinarian can give to the agriculturist, it is rarely asked for. The farmer is not willing to pay for advice, and because he is not paid for it the practitioner in veterinary medicine is not likely to devote much of his time and energy to the helminthological part of his work.

That we have not been able to reserve to ourselves the use and the dispensing of anthelmintic drugs is unfortunate, as that would have greatly strengthened the link between farmer and veterinarian. Many of these substances are among the most dangerous that are used in farm practice; reports of losses from the use of nicotine sulphate, carbon tetrachloride and chenopodium have often appeared in the literature and it would seem that at one time a case could have been made for reserving their use to those who knew something about them. This is quite beyond our power at the present time, however, the commercial dispensers having become too firmly entrenched. As a result of the efforts of these concerns to increase their sales the farmers are now exhorted on every hand to use the drugs, and it is not surprising that much lack of discrimination is shown. The idea is now widespread among stock owners that merely knowing the name of a suitable drug is sufficient to enable them to eliminate loss from parasitic worms. The value of anthelmintic medication is judged entirely from the farmer's own experience, often after unfitting application, and the advantages of proper veterinary advice are not appreciated. No wonder then that the practising veterinarian tends to let his helminthology go and to regard his training in that subject as one of the least useful parts of the equipment with which he is turned out of the veterinary college.

The causes underlying some of these helminthic diseases are very involved and quite beyond the understanding of the agriculturist, and there is no doubt that the exclusive dispensing of anthelmintic drugs by veterinarians would lead to a more frequent contact with these diseases and a more efficient use of the anthelmintics, to the more assiduous study of helminthology by practitioners and the better control of the parasites.

At the present time there seems to be a tendency among clinicians to use the designation " helminthiasis " as a convenient explanation of the cause of any indefinite wasting disease that may be difficult to diagnose—and this brings the discussion to a point at which reference can be made to one or two of the items of " helminthological news " to which reference was previously made.

The first of these points concerns the frequent reports which have recently been received of the failure of phenothiazine to produce a response in outbreaks of parasitic gastritis in sheep and in cattle. Parasitic gastritis or gastro-enteritis is a rather general term for a very variable disease or group of diseases. Some dozen species of helminth are concerned and an outbreak of disease may be caused by any one or any combination of those species. As their responses to phenothiazine are of very different orders there is seen to be plenty of scope for varying success from its use. Furthermore, if phenothiazine is compared with copper sulphate or copper and nicotine it is found to be a very expensive remedy, so that in order to assist the

sales the commercial firms advertise the lowest dose that might be expected to give some result in the majority of outbreaks of the disease. Even at that dosage it is relatively expensive and the farmer who buys it is likely further to reduce this dose unless his sheep happen to be particularly badly affected at the time. As the efficiency of phenothiazine falls very rapidly when fractional doses are used the result that the farmer obtains is disappointing.

In cases of this kind it is sometimes desirable to have a more accurate diagnosis than that of " parasitic gastritis," which, as we have seen, is a generic term, and to secure some knowledge on the species of helminth that is responsible. For this purpose it may be desirable to seek the aid of a specialist, when it may be possible to find a sound reason for failure of the prescribed treatment and to restore the confidence of the client.

A second point in " helminthological news " concerning phenothiazine is the practice which has been greatly advocated in some places of mixing phenothiazine with the food, or of offering it to stock in the form of a salt lick. In many places in Great Britain this method fails completely because the stock will not take sufficient of the salt mixture, although in other places its efficacy has been demonstrated. The mode of its operation, however, is not through ordinary anthelmintic action.

The worms are not killed and expelled, but the egg-production of the females is partially or completely inhibited, and the development of larvae from what few eggs there may be in the faeces is also prevented. As a result the building up of heavy infections in the pasture herbage ceases and the young grazing animals remain healthy.

And this brings me to a third point concerning phenothiazine and a new use to which it may be put in the prevention of infection in thoroughbred foals, where expense and trouble is not an important consideration. Having found at Weybridge that small daily doses of phenothiazine almost completely inhibit egg production in female strongyle worms, and prevent the development of larvae in the faeces we continued its administration daily for 12 months and found there to be no untoward effect on the host, so showing that it is at least possible to rear worm-free foals. The work was taken up at this point by the Animal Health Trust, and although after Miss Russell's retirement it has been found difficult to pursue this line of investigation, sufficient was done to show that worm-free foals could be produced.

This mixture of parasiticidal drugs with the food of animals is not without its dangers in more ways than one as will be agreed when reference is made to the recent wide development in the United States of sulphaquinoxaline treatment for coccidiosis, administered in the form of a medicated ration. This sulpha drug is incorporated in the chicken feed by the millers and animal-food manufacturers and is purchased by the poultry farmers from the retail corn merchants for administration to groups of chickens that are thought to be threatened with coccidiosis. As far as one can gather from the literature the method is successful, but the risks from long term or careless administration are considerable. Sulphonamides are dangerous drugs and when they are sold in the form of a food in a packet they quickly lose the little respect which they may have had when sold in a bottle marked " poison." It is easy to visualise the careless uses to which such mixtures may be put ; furthermore, it is a practice that, once begun, may extend to the treatment of other diseases so that a wholesale dispensing of dangerous medicaments may get into the hands of a section of the commercial community with whom we have no recognised contact.

Having dealt with one or two points concerning phenothiazine I should like now to mention others concerning parasitic gastr t's of sheep and cattle, and first of all the matter of subclinical infection and the difficulty of its diagnosis. Worm counts at *post-mortem* examination of affected members of the flock are by far the best aid. If the practitioner were to be called in to many of these affected flocks it would doubtless be worth his while to learn the technique and gain the necessary skill for ca·ry ı g it out expeditiously, but where his contacts with such occurrences are rare it is doubtless best to call in the assistance of an expert. Egg counts are less reliable than are worm counts as not only do the various species of worm lay eggs at very different rates but the egg output of the individual worms varies very much with the state of resistance of the hosts. This point has become increasingly evident during the last few years and has made us even more cautious than before of making a negative diagnosis on egg count alone.

One of the greatest difficulties in dealing with parasitic gastritis is its indefinite nature. Where the effects may be sub-clinical there would seem to be an indication for occasional controlled observations on the part of the practitioner, wherein he treats only half of a flock or herd that is thought to be suffering from sub-clinical parasitism in order to have a check on any improvement that may appear to result from the treatment. By so doing he may better his understanding of the origin of poor thriving among the flocks and herds of his clients, and secure information for himself as to how much or how little of it is due to worms.

This matter of running a controlled trial brings us to a topical point concerning parasitic bronchitis in cattle. This, I take it, is generally acknowledged to be the worst disease of young stock on the dairy farm. A considerable loss occurs through fatal infections, a still greater loss from the high morbidity rate where outbreaks have occurred, but probably the greatest loss to the country comes through the enforced rearing of calves indoors throughout the first year and in some districts the first two years of their lives. The most unsatisfactory state of our present knowledge of this disease drives us to attempted cure by any means that may be suggested, as in the case of "Anthiomaline " which recently has been advocated by one of the commercial concerns for the treatment of husk.

"Anthiomaline " is, an antimonial preparation of value in the treatment of schistosomiasis, filariasis and leishmaniasis. As far as one can ascertain, however, there is no real evidence in support of its efficacy in the destruction of the strongyloid worms responsible for husk. It has been my good fortune to come across two veterinary practitioners who have observed the wise precaution of keeping controls and after definite diagnosis (confirmed by the observation of large numbers of the worms at *post-mortem* examination of affected animals) have proceeded to treat only half of the group, keeping the other half as a control. In neither of these instances was any beneficial result observed. On the other hand, I have heard, from sound practitioners, of beneficial effects thought to have been recognised by them during the ordinary procedure of uncontrolled clinical observation. Still others, proceeding in the same uncontrolled way, have concluded that the treatment was useless.

We now find ourselves discussing the procedure of running controlled experiments in the field and it might well be asked, what has this to do with veterinary practice? I think we must recognise this subject of the control of helminthic disease among animals of economic importance

as on the border line of the clinician's territory. Proceeding outwards from that territory one soon enters the adjoining region of preventive veterinary medicine and of advisory work on the maintenance of the health of animals under ordinary agricultural conditions. The cure of existing disease or the curtailment of epidemics, or even the diagnosis of sub-clinical disease is doubtless a proper field of activity for the veterinary clinician, but it seems that he enters only fortuitously into the preventive field. So long as the farmer is reluctant to pay for advice in the prevention of disease the clinician will not seek assiduously to give it. In our discussions we should doubtless consider how best to increase our usefulness to the community; that it will ultimately lead to financial reward over the matter of advice on prevention of worm disease would appear, however, to be a pious hope. One thing is certain, that the treatment of existing disease is the most satisfactory; the curtailment of an existing epidemic or even of loss from existing sub-clinical parasitism also has its satisfaction as in each instance there may be evidence of success. Not so, however, over the matter of prevention; when that aim succeeds there is nothing to show and those who enter the preventive field are in the unfortunate position of being able to produce no tangible evidence of success but only of failure.

However much it may be desirable, therefore, to enter this particular field of preventive veterinary medicine it is a difficult one in which to gain credit and a still more difficult one in which to gain remuneration.

(To be continued with report of discussion)

NEW INSTRUMENTS AND APPLIANCES

SIMPLIFIED VERSION OF THE KIRSCHNER-EHMER SPLINT

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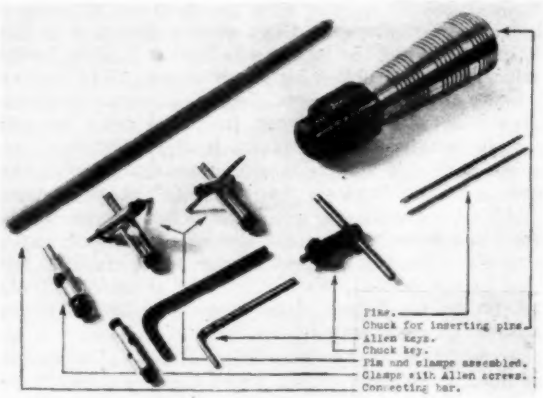
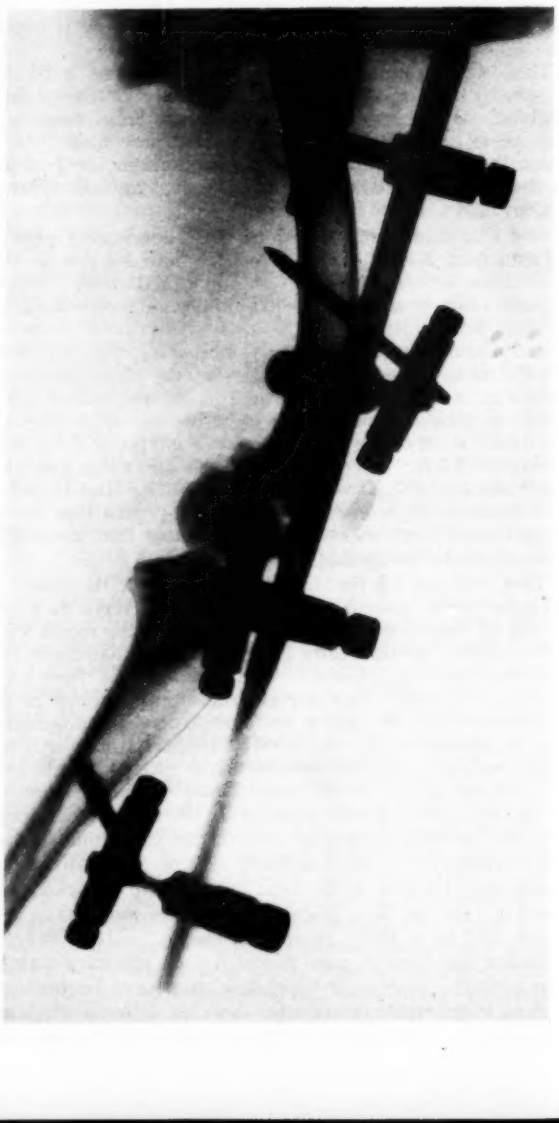
Following the demonstration of bone-pinning by our American colleague, Jack O. Knowles, V.M.D., at last year's Congress, I endeavoured to purchase the various components of the Kirschner-Ehmer splint. My efforts in this direction were unsuccessful, so I designed and made the simplified version which is shown in the accompanying photographs.

The pins are shortened Steinman pins of stainless steel, the clamps are turned from duralumin and the connecting rod is also duralumin. The set screws are steel machine screws, with "Allen" heads. The total weight of the splint as used in the particular case shown is only 2 oz.

The illustrations show the very successful application of the splint in the case of a separation and backward rotation of the distal epiphysis of the femur, this being a notoriously difficult fracture to deal with by any other method of fixation. The two proximal pins are inserted into the shaft of the femur, and the two distal pins into the shaft of the tibia, with the limb in the fully extended position. The splint was left *in situ* for three weeks, and the dog regained normal action of the limb within two or three days of its removal.